

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : William G. Tong                      Art Unit: 2878  
Serial No.: 10/540,224  
Filed : August 8, 2006  
Title : SENSITIVE SENSING BASED ON OPTICAL NONLINEAR WAVE MIXING

## MAIL STOP AMENDMENT

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

## INFORMATION DISCLOSURE STATEMENT

Applicants call attention to the attached Information Disclosure Statement and documents listed on form PTO-1449.

This filing is being made before the receipt of a first Office action on the merits. No fee is required.

The documents are in the English language; hence no concise explanation is necessary per Rule 98(a)(3).

Consideration of the foregoing and enclosures plus the return of a copy of the enclosed form PTO-1449 with the Examiner's initials in the left column per MPEP 609 are earnestly solicited along with an early action on the merits.

Please apply any credits or additional charges to deposit  
account 06-1050.

Respectfully submitted,

Date: April 2, 2007

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Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 07252-025US1	Application No. 10/540,224
<b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary)		Applicant <b>William G. Tong</b>	
		Filing Date <b>August 8, 2006</b>	
(37 CFR §1.98(b))		Group Art Unit 2878	

**U.S. Patent Documents**

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	AA	4,284,354	08/1981	Liao			
	AB	4,355,897	10/1982	Kaye			
	AC	4,540,283	09/1985	Bachalo			
	AD	4,622,642	11/1986	Bajard et al.			
	AE	4,854,705	08/1989	Bachalo			
	AF	5,166,507	11/1992	Davis et al.			
	AG	5,600,444	02/1997	Tong			
	AH	6,141,094	10/2000	Tong			
	AI						

**Foreign Patent Documents or Published Foreign Patent Applications**

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AJ							
	AK							
	AL							

**Other Documents (include Author, Title, Date, and Place of Publication)**

Examiner Initial	Desig. ID	Document
	AM	Andrews, J., et al., "Atomic flame spectrometry based on polarization-modulated optical phase conjugation by resonant degenerate four-wave mixing", <i>Spectrochimica Acta Part B: Atomic Spectroscopy</i> , 44B(1):101-107, (1989).
	AN	Andrews, J., et al., "Doppler-Free Spectrum of the Barium $^1S_0-^1P_1$ Transition by Degenerate Four-Wave Mixing Using an Air/Acetylene Flame", <i>Applied Spectroscopy</i> , 45(4):697-700, (1991).
	AO	Atherton, A., et al., "Ultrasensitive absorption detection of protein and DNA microarrays based on nonlinear multi-photon wave-mixing spectroscopy", <i>Proc. SPIE</i> , vol. 5969, pp. 59690P, September 2005.
	AP	Bao, X., et al., "Excited-state optical storage study in a dye-doped film using four-wave mixing spectroscopy", <i>Proc. SPIE</i> , vol. 2998, pp. 343-347, January 1997.
	AQ	Bao, X., et al., "Optical Nonlinearity and Multiplex Holographic Storage in Azo Side-Chain Liquid Crystalline Polymer", <i>Proc. SPIE</i> , vol. 3474, pp. 183-189, October 1998.
	AR	Berniolles, S., et al., "Diode laser-based nonlinear degenerate four-wave mixing analytical spectrometry", <i>Spectrochimica Acta Part B: Atomic Spectroscopy</i> , 49B(12-14):1473-1481, October-December 1994.

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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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	AS	Berniolles, S., et al., "Low-power compact laser-based nonlinear degenerate four-wave mixing detection for flowing liquids", <i>Proc. SPIE</i> , vol. 2546, pp. 145-151, September 1995.
	AT	Berniolles, S., et al., "Sensitive absorbance measurement for gas-phase analytes based on multi-wave mixing spectroscopy", <i>Proc. SPIE</i> , vol. 2835, pp. 248-254, November 1996.
	AU	Berniolles, S., et al., "Sensitive Capillary-Based On-Column Detection Method By Laser Wave Mixing", <i>Proc. SPIE</i> , vol. 2980, pp. 127-132, May 1997.
	AV	Berniolles, S., et al., "Sensitive On-Column Absorbance Detection of Naïve Molecules", <i>Proc. SPIE</i> , vol. 3270, pp. 200-206, May 1998.
	AW	Briggs, R., et al., "Sub-Doppler high-resolution wave-mixing detection method for isotopes in environmental applications", <i>Proc. SPIE</i> , vol. 5586, pp. 54-59, December 2004.
	AX	Chen, D., et al., "High-resolution Laser Spectroscopy Based on Polarisation-modulated Optical Phase Conjugation in a Demountable Cathode Discharge", <i>J. Anal. Atomic Spectrometry</i> , vol. 3, pp. 531-535, June 1988.
	AY	Kan, H., et al., "Sensitive wave-mixing detectors for capillary electrophoresis and liquid chromatography", <i>Proc. SPIE</i> , vol. 2835, pp. 135-142, November 1996.
	AZ	Knittle, J., et al., "Sensitive detection of enzyme activity by multi-photon nonlinear laser spectroscopy", <i>Proc. SPIE</i> , vol. 5587, pp. 177-182, November 2004.
	BA	Lopez, M., et al., "Laser wave-mixing optical method for sensitive detection of analytes in microarrays and microchips", <i>Proc. SPIE</i> , vol. 5591, pp. 185-189, December 2004.
	BB	Luena, G., et al., "Doppler-Free Laser Polarization Spectroscopy Using a Demountable DC Cathode Discharge Cell as a Trace Concentration Atomizer", <i>Applied Spectroscopy</i> , 44(10):1668-1672, (1990).
	BC	Lyons, W., et al., "Nonlinear wave-mixing spectroscopy for sub-Doppler isotope analysis with trace-level detection sensitivity", <i>Proc. SPIE</i> , vol. 5971, pp. 597109, September 2005.
	BD	Maniaci, M., et al., "Multiphoton laser wave-mixing absorption spectroscopy for samarium using a graphite furnace atomizer", <i>Spectrochimica Acta Part B: Atomic Spectroscopy</i> , 59(7):967-973, July 2004.
	BE	Mann, B., et al., "Detection and imaging of nitrogen dioxide with the degenerate four-wave-mixing and laser-induced-fluorescence techniques", <i>Applied Optics</i> , 35(3):475-481, January 1996.
	BF	Mickadeit, F., et al., "Sensitive Sub-Doppler Nonlinear Spectroscopy for Hyperfine Structure Analysis Using Simple Atomizers", <i>Proc. SPIE</i> , vol. 3270, pp. 168-173, May 1998.
	BG	Mickadeit, F., et al., "Sub-Parts-Per-Quadrillion-Level Graphite Furnace Atomic Absorption Spectrophotometry Based on Laser Wave Mixing", <i>Anal. Chem.</i> , 76(6):1788-1792, March 2004.
	BH	Neyer, D.W., et al., "Circular Dichroism Spectroscopy Using Coherent Laser-Induced Thermal Gratings", <i>J. American Chemical Society</i> , 119(35):8293-8300, (1997).
	BI	Nunes, J., et al., "Circular Dichroism Spectroscopy by Four-Wave Mixing Using Polarization Grating-Induced Thermal Gratings", <i>J. Phys. Chem. A</i> , 101(18):3279-3283, (1997).
	BJ	Nunes, J., et al., "Optical Fiber-Based Wave Mixing as a Convenient and Sensitive Laser Analytical Tool for Condensed-Phase Analytes", <i>Applied Spectroscopy</i> , 52(5):763-769, (1998).
	BK	Nunes, J., et al., "Optical Fiber-Based Wave-Mixing Probe", <i>Proc. SPIE</i> , vol. 2980, pp. 429-433, May 1997.
	BL	Nunes, J., et al., "Sensitive Circular Dichroism Spectroscopy Based on Nonlinear Degenerate Four-Wave Mixing", <i>Anal. Chem.</i> , 65(21):2990-2994, November 1993.

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	BM	Nunes, J., et al., "Sensitive laser wave-mixing detection methods for biomedical applications", <i>Proc. SPIE</i> , vol. 2388, pp. 205-212, May 1995.
	BN	Tong, W., et al., "Doppler-Free Spectroscopy Based on Phase Conjugation by Degenerate Four-Wave Mixing in Hollow Cathode Discharge", <i>Applied Spectroscopy</i> , 41(4):586-590, (1987).
	BO	Tong, W., et al., "Laser Spectrometry Based on Phase Conjugation by Resonant Degenerate Four-Wave Mixing in an Analytical Flame", <i>Anal. Chem.</i> , 59(6):896-899, March 1987.
	BP	Weed, K., et al., "Sensitive sub-Doppler multiwave-mixing spectroscopy for flame and graphite furnace atomizers", <i>Proc. SPIE</i> , vol. 2385, pp. 157-164, April 1995.
	BQ	Weed, K., et al., "Trace Analysis of Rubidium Hyperfine Structure in a Flame Atomizer Using Sub-Doppler Laser Wave-Mixing Spectroscopy", <i>Applied Spectroscopy</i> , 57(12):1455-1460, December 2003.
	BR	Wu, Z., et al., "Absorbance detection of amino acids by laser wave mixing in microbore liquid chromatography", <i>J. of Chromatography A</i> , 805(1-2):63-69, May 1998.
	BS	Wu, Z., et al., "Doppler-free measurement of the calcium $4s^2\ ^1S_0-4s\ ^1P_1$ transition at 422.673 nm by degenerate four-wave mixing in a demountable cathode discharge atomizer", <i>Spectrochimica Acta Part B: Atomic Spectroscopy</i> , 47B(3):449-457, March 1992.
	BT	Wu, Z., et al., "Forward-Scattering Degenerate Four-Wave Mixing as a Simple Sub-Atomole-Sensitive Nonlinear Laser Analytical Spectrometric Method", <i>Anal. Chem.</i> , 65(2):112-117, January 1993.
	BU	Wu, Z., et al., "Laser Analytical Spectrometry Based on Optical Phase Conjugation by Degenerate Four-Wave Mixing in a Flowing Liquid Analyte Cell", <i>Anal. Chem.</i> , 61(9):998-1001, May 1989.
	BV	Wu, Z., et al., "Sensitive absorbance detection method for capillary electrophoresis based on laser wave-mixing", <i>J. of Chromatography A</i> , vol. 773, pp. 291-298, (1997).
	BW	Wu, Z., et al., "Sensitive absorbance measurement method based on laser multi-wave mixing", <i>Spectrochimica Acta Part B: Atomic Spectroscopy</i> , 49B(12-14):1483-1489, October-December 1994.
	BX	Wu, Z., et al., "Stable Isotope Ratio Analysis at Trace Concentrations Using Degenerate Four-Wave Mixing with a Circularly Polarized Pulsed Probe Beam", <i>Anal. Chem.</i> , 63(9):899-903, May 1991.
	BY	Wu, Z., et al., "Trace-Concentration Detection of Cobalt in a Liquid Flow Cell By Degenerate Four-Wave Mixing Using Low-Power Off-Resonant Laser Excitation", <i>Anal. Chem.</i> , 63(18):1943-1947, September 1991.

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